

# Effect of Contextual Teaching-Learning Approach on Students' Retention in Chemistry in Secondary Schools in Anambra State

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## ABSTRACT

The study investigated the effect of contextual teaching-learning approach (CTLA) on chemistry students' academic retention in secondary schools in Anambra State, Nigeria. A pre-test, posttest quasi-experimental design was used involving a sample of 130 students drawn from six education zones in the state. The instrument known as contextual learning chemistry retention test (CLCRT), validated by two experts with a reliability coefficient of 0.84 was used for data collection. Two research questions and two hypotheses guided the study. Mean and standard deviation were used to answer the research questions, while t-test was used to test the null hypotheses at  $P < 0.05$ . The result revealed that CTLA had significant effect on students' academic retention in chemistry. Finding implies there is need for chemistry teachers should adopt the use of contextual teaching-learning approach to improve the performance of students in chemistry.

**KEYWORDS:** Science Technology, Contextual Teaching-Learning Approach, Gender, Chemistry Instruction

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## INTRODUCTION

The role of science and technology in national development cannot be exaggerated. Any nation which fails to adequately consider Science, Technology, Engineering and Mathematics (STEM) education has planned to be left behind in all spheres of development. Speedy and viable growth of any nation can only be attained through scientific research, coherent application of STEM knowledge and skill (Okeke 2008). STEM is a tool for social, economic and political development of a nation. The contribution of STEM to social, industrial and economic life of the world in general and Nigeria in particular have been felt on all phases of human life (Ikeobi 2010). The knowledge of STEM has enabled the provision of good water, food, and healthcare delivery, various materials for construction in industries, roads, automobiles, and houses. STEM subject like chemistry is used in solving problems resulting human interaction with the environment like water, land and air pollution.

Despite the relevance of knowledge of chemistry to the society, retention of students in chemistry and other science subjects as measured by their scores in senior secondary school certificate examinations have been very poor among African developing countries like Nigeria (Ugo & Akpoghol, 2016). Presently, countries in the world are categorized as: developed, developing and less/under developed. The difference between the developed, developing, and under developed countries however rest on the ability of the

developed countries to convert scientific ideas to usable technology while the developing and underdeveloped countries are yet to do so effectively (Ugo & Akpoghol, 2016). Presently, Nigeria remains a developing country with low economic, social, political, cultural, and technological indicator (UNESCO, 2009). In recognition of the impact of STEM development to the overall national development, Federal Government of Nigeria has been supporting it through policies, actions and programmes, especially core science subjects like chemistry, physics and biology which are useful in many industries for technological development.

Within the context of science education, chemistry has been identified as a very important school subject. Its importance in scientific and any technological development of nation like Nigeria cannot be over emphasized. Its recognition as core science in Nigerian Education system shows its importance in national development (Ademu, Boris & Kenni, 2012). Chemistry is linked to everything on earth as aptly captured in a slogan: what on earth is not chemistry? There is no aspect of human endeavour or natural phenomena that chemistry does not feature. It features prominently in the areas of oil and gas, agriculture, health, environment, solid minerals, textile, cosmetics, water supply, sanitation, crime detection, paper, waste management, just name it (Hashimi 2018). Chemistry is the catalyst for sustainable national growth and development. Chemistry is offered at the senior

secondary classes in order to help students learn important aspect of scientific concepts that would enable them live effectively in their immediate environment (Ademu, Boris & Kenni, 2020). Despite the importance of chemistry and its education value which is relevant to the need of individual learner economics and technological breakthrough of a nation and the effort of researchers to improve its teaching and learning, the retention of students in the subjects is not still encouraging which evidently shown in students performance (Ezeliora & Obikezie 2017).

The poor retention of students in chemistry has continued to be a major cause of concern to all, particularly those in the mainstream of chemical education in Nigeria (Sakiyo & Badew, 2015). They went further to prove from data collected that between 2008 – 2012, percentages pass of chemistry students in grade A1 – C6 West Africa Senior Secondary School Certificate is 46.30%. Bello and Oke (2015) supported the claim from the data collected from West African Examination Council Nigeria that the percentage passes of chemistry students in 2013 and 2014 in grades of A1 – C6 are 40.4% and 45.50% respectively. Many factors have been attributed as the cause of poor retention through performance in chemistry which evidently shown especially in West African Senior Secondary School Certificate Examination performance. Among factors identified were poor methods of teaching and learning, laboratory inadequacy and non-availability of effective teaching and learning resources in classroom (Sakiyo & Badau, 2015; Bello & Oke 2015). The need for new active teaching strategies is more urgent than ever, as the traditional approaches are not very effective with today's students (Ikeobi, 2010). This was what prompted the present study which try to find the effect of contextual teaching-learning approach on students' retention in chemistry in secondary schools in Anambra State.

Contextual Teaching and Learning approach (CTLA) is a conception of teaching and learning that helps teachers relate subject matter content to real world situations and motivates students to make connections between knowledge and its applications to their lives as family members, citizens, and workers. The concept of Contextual Teaching and Learning teaching emphasizes the full student's activity both physically and mentally (Mucher, 2017). Contextual teaching and learning consider that learning is not a memorizing activity, considering facts nor demonstrating repetitions exercise but a process of experience in life naturally. CTLA is a learning concept that helps teachers to connect a subject matter being studied and implement it in all aspects of life. Students acquire knowledge and skills from limited context gradually, and from the process of self-construction, so that learning will be meaningful. This CTLA have been used by many educators in Arts and Humanities but science educators and teachers need to use it most to enhance learning in the sciences. Nurhadi (2000) in Satriani, Emilia, Gunawan (2012) has argued that the constructivism philosophy is the reason why teachers choose CTLA as an alternative teaching and learning approach. In this case, the students are expected to learn through "experiencing" not by "memorizing" the subject matter. CTLA motivates the learners to take charge of their own learning and to relate between knowledge and its application to the various contexts of their lives. It has a characteristic of relating, experiencing, applying, cooperating, and transferring knowledge learnt (Crawford, 2001). With the numerous

benefits of contextual teaching-learning approach, the researcher sought to investigate its effect on the retention of chemistry students when taught certain chemistry concepts with it.

### Purpose of this Study

The purpose of this study is to determine the effect of contextual teaching-learning approach on students' retention in chemistry in secondary schools in Anambra State specifically, the study sought to achieve the following;

1. To determine the academic retention of chemistry students when taught with contextual teaching-learning method.
2. To determine if there is difference in the academic retention of male and female students when taught chemistry with contextual learning method.

### Research Questions

Two research questions guided the study

1. What are the differences in the mean academic retention score of SS 2 students when taught chemistry concepts using contextual teaching- learning approach in Anambra State?
2. What is the difference in pretest and posttest mean academic retention score of male and female students taught chemistry using contextual learning method?

### Hypotheses

Based on the research questions, the following hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant difference in the academic retention of SS 2 students when taught chemistry concepts with contextual teaching-learning method and when taught in a conventional method.
2. There is no significant difference in the pretest and posttest mean academic retention scores of male and female students taught chemistry using contextual learning method.

### Method

The design adopted for study was quasi – experimental design, specifically, pre-test, post-test control group design. The experimental design allows the researchers to manipulate the independent variables in order to determine its effects on the dependent variable. The population of the study was all SS2 chemistry students in the state totaling 759 students. The sample consisted of 130 SS2 chemistry students selected from six educational zones in Anambra State. One co-educational school was selected from each of the education zone because gender was inclusive in the research. Criteria sampling technique was used for the selection of one co-educational school from each zone. One of the criteria is that the school must have presented candidates for West African Senior School Certificate Examination (WASSCE) for at least 3 times. Secondly, the school must have a chemistry teacher with at least 5 years teaching experience. The study covered a period of five weeks. Second and third week was used to teach the chemistry concepts with conventional method after which the 20 objective questions pretest was administrated to the students. The fourth and fifth week was used to teach the students the same chemistry concepts with contextual teaching-learning approach after which the same 20 objective question was also administered to the students this time the question and options were rearranged and printed with a different coloured paper. The SS 2 chemistry teachers of the six selected co-educational schools served as the research assistants. The teachers were given detailed

information and instruction concerning the study. Each used the note of lesson prepared notes prepared by the researchers to teach in the five weeks. The tests conducted (pre-test and posttest) were marked by researchers.

### Instrument

The instrument used for data collection was researchers' developed 20-item objective question gotten from WASSEC past question papers in line with the topics in SS2 second term syllabus. The instrument was titled Contextual-Learning Chemistry Retention Test (CLCRT). The Contextual Learning Chemistry Retention Test (CLCRT) was produce base on the chemistry concepts of Chemical reaction, Halogens, Water and Air according in senior secondary two (SS2) chemistry curricula. The CLCRT was validated by experts in chemistry from Faculty of Education Nnamdi Azikiwe University, Awka and Educational Foundations Chukwuemeka Odumegwu Ojukwu University Igbaram. Comments and suggestions made by them were used in the production of the final test items of CLCRT. The test items

covered the four topics which was taught. The test was scored according to the marking scheme developed the researchers by ticking the right option A – D.

To ensure the reliability of the instrument, the 20 objective questions were administered to a trail testing group of 15 students who were not part of the main study. The results of pretest and posttest obtained in the administration were subjected to spearman Rank-order correlation method to correlate the two sets of test scores. A coefficient of 0.84 was obtained, indicating that the instrument was reliable. The data obtained from the pretest and posttest were analyzed using mean, standard deviation and t-test.

### Results

The results are presented in answer to research questions and hypotheses.

**Research question 1:** What is the academic retention score of SS 2 students when taught chemistry concepts using contextual teaching-learning approach in Anambra State?

**Table 1: Pre-test and Post-test mean retention scores of students.**

Gender		(Posttest)	(Pretest)
MALE	Mean	10.6094	7.5000
	N	64	64
	Std Deviation	2.75230	2.73716
FEMALE	Mean	14.5692	9.5846
	N	66	66
	Std Deviation	12.70823	3.07150
TOTAL	Mean	12.6047	8.5504
	N	130	130
	Std Deviation	9.40364	3.08211

Table 1: shows that the post-test mean score of students which is (12.6047) is higher than the pre-test mean sore (8.5504). This means that CLCRT contextual learning, enhances students' academic retention in chemistry concepts more than the conventional method with a mean difference of 4.0543.

**Research question 2:** What is the difference in pretest and posttest mean academic retention scores of made and female students taught chemistry using contextual learning method?

**Table 2: Pre-test and Post-test mean retention scores of male and female students**

	Gender	N	Mean	Std Deviation	Std Error Mean
PRETEST	MALE	64	7.5000	2.73716	.34215
	FEMALE	66	9.5846	3.07150	.38097
POSTTEST	MALE	64	10.6094	2.75230	.34404
	FEMALE	66	14.5692	12.70823	1.57626

Table 2 shows that the mean score of male students is 7.5000 as at against that of female students which is 9.5846 in pretest. In post-test the men score of male students is 10.6094 at against that female students which is 14.5692. This means that the female students retention score higher than that of male students in both pre-test and post-test with a mean score difference of 2.0846 and 3.998 respectively. Looking closely at the standard deviation (SD) of both pretest and post test for males which are 2.7316 and 2.75230, there seems not to be much variations or disparity in the academic retention among the male students even when taught with different methods. Teaching methods effect the male students equally. The female students on the order hand, had 3.07150 and 12.70823 as pretest and posttest standard deviations (SD) respectively. The posttest had a wider variation that the pretest showing that the female students were more effected by CTLA. Some female students improved in their academic retention more than others hence the wide variations.

**Ho<sub>1</sub>:** There is no significant difference in the academic retention of SS 2 students when taught chemistry concept with contextual learning method and those taught in a conventional method.



**Table 3: t-test analysis of pretest and post-test mean academic retention score of students**

		Levene's Test Equality of Variances					t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error95% Difference	Confidence Interval of the Difference	
									Lower	Upper
PRETEST	Equal Variances assumed	2.116	.148	-4.067	127	.000	-2.08462	.51252	-3.09880	-1.0704
	Equal Variances not assumed			-4.071	125.762	.000	-2.08462	.51206	-3.09798	-1.0712
POSTTEST	Assumed	1.798	.182	-2.437	127	.016	-3.95986	1.62489	-7.17521	-7445
	Equal Variance not assumed			-2.454	70.081	.017	-3.95986	1.61337	-7.17755	-7421

Table 3 shows that F scores of pretest and post-test which is 2.116 and 1.795 is greater than the t score of pretest and post-test which is -4.067 and -2.437 respectively at 0.05 level of significance. Thus, the null hypothesis is rejected, implying that there is a difference in the mean academic retention of students when taught with contextual method and when taught with conventional method. The mean difference is statistically significant in favour of contextual method.

**HO<sub>2</sub>:** There is no significant difference in the pretest and posttest academic retention scores of male and female students taught chemistry using contextual learning strategy.

**Table 4: Univariate analysis of pretest and posttest mean scores of male and female students**

Source	Type III Sum	df	Mean square	F	Sig
Corrected Model	1270.141	2	635.070	7.963	.001
Intercept	384.128	1	384.128	4.817	.030
Pretest	764.476	1	764.476	9.586	.002
Gender	138.413	1	138.413	1.736	.190
Error	10048.697	126	79.752		
Total	11318.837	129			
Corrected Total	11318.837	128			

R squared = .112 (Adjusted R Squared = .098)

Table 4 shows that Gender has no significant difference since it has a 0.190 significance which is bigger than 0.05, the learning strategy of CTLA affected equally by both male and female students.

## Discussion

The result of this study had shown that students retain better when taught with contextual approach (CTLA) than when taught with conventional method (CM). This could be due to the fact CLCRT (posttest) came after the conventional method of teaching (pretest) thereby making the students to perform better due to residue knowledge from conventional method (CM). The result of the study supports the views of previous researchers (Sakiyo & Badau 2015) and (Bello & Oke 2015) who indicated that the retention of students in West African Senior Secondary School Certificate Examination in grade level A – C6 and D7 – F9 may be as a result of teaching method used by the chemistry teachers. Candidates that did well as a result of residue knowledge students have gotten why learning in classroom. The result also showed that gender had no significant effect on retention of the students. The findings of this study, effect of contextual teaching-learning approach on retention in chemistry in secondary schools in Anambra State shows that there is no significant difference in academic retention of male and female students taught chemistry using contextual method approach (CTLA).

## Conclusion

Based on the finding of the study, it was concluded that students who were taught chemistry concepts with CTAL had higher mean retention scores than those students taught with conventional method (CM). The use of CTLA have served as an instrument for consolidation of knowledge.

From the study, there is no significance difference in the mean academic retention among gender when taught chemistry concepts with CTLA. The use of CTLA in the teaching of some chemistry concepts as used in this study added real value to the teaching of chemistry, not only did it increase students' understanding of the concepts, it added to the teachers' instructional strategies for teaching difficult and abstract concepts. Teachers adopting the use of contextual learning method in chemistry concepts will enhance the efficiency of teaching-learning of chemistry concepts and easy assimilation of chemistry information.

## Recommendations

Based on the findings and their implications, the following recommendations were made:

1. Since the use of contextual method (CTLA) in teaching has been found to enhance retention in chemistry, chemistry teachers should employ it more in the teaching of the subject.
2. Since residue knowledge from conventional method (CM) may be a factor that enhances the retention of students in contextual method (CTLA), teachers were advised to use two or more suitable teaching methods for effective academic retention in chemistry.
3. Chemistry teachers should be provided with the facilities such as computers, storages devices and projectors which they need for preparing and teaching their lessons especially when two teaching methods will be used in other to manage time in the classroom.

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